

## ABSTRACT

An optical apparatus comprises a semiconductor optical device waveguide formed on a semiconductor substrate, and an integrated end-coupled waveguide formed on the semiconductor substrate. The integrated waveguide may comprise materials differing from those of the device waveguide and the substrate. Spatially selective material processing may be employed for first forming the optical device waveguide on the substrate, and for subsequently depositing and forming the integrated end-coupled waveguide on the substrate. Spatially selective material processing enables accurate spatial mode matching and transverse alignment of the waveguides, and multiple device waveguides and corresponding integrated end-coupled waveguides may be fabricated concurrently on a common substrate on a wafer scale. The integrated end-coupled waveguide may be adapted for fulfilling one or more functions, and the device waveguide and/or integrated waveguide and/or spatially selective material processing steps may be adapted in a variety of ways for achieving the needed/desired degree of end-coupling.